Stakeholder Working Group, February 13, 2007

Description of Options for Reducing Emissions from the Commercial Sector (RCI-35 to 59)

The commercial sector includes schools, churches, government buildings, restaurants, office buildings, stores, and hospitals and other structures. According to the 2000 Department of Natural Resource's study, the commercial sector will release 14.1 million tons of CO2 by the year 2010, up from 7.8 million tons of CO2 in 1990, an increase of about 4.0 percent a year. The commercial sector accounted for 19.1 percent of Utah's energy-related GHG emissions in 1998 and, because of the rapid growth of this sector, account for 20.5 percent of CO2 in 2010.

The options listed in the Utah Policy Options spreadsheet that the SWG has been using are reproduced below, along with the information we have been able to find so far.

Text in italics represents information added since this memo was circulated via email to the SWG on February 8th.

Overall Commercial Sector Options

RCI-35
Name: Equipment Efficiency Standards

1. **Appliance Efficiency Standards**

Definition: Appliance efficiency standards establish lower energy levels for appliances snd may prohibit the sale of less efficient models. More stringent appliance efficiency standards would make energy efficiency improvements less costly by implementing new technologies into basic appliance models. Federal efficiency standards do not cover all appliances requiring the state to form their own. With the cooperation of other Western states Utah could also advocate stronger federal efficiency standards for appliances.

State legislature is likely required for the implementation of appliance efficiency standards. Many states, such as California, offer models on implementing efficiency standards for appliances not covered by federal law. Once legislation is in place an administrative agency may be set up to facilitate standard adoption. Communication down the line from product producers, distributors, installers, utilities, and consumers is necessary. Also, other issues need to be addressed such certification requirements and which products will be covered by new standards.

Arizona passed energy efficiency standards for twelve products (torchiere light fixtures, exit signs, commercial refrigerators and freezers, commercial clothes washers, large commercial air conditioning equipment, icemakers, spray nozzles used in commercial kitchens, low-voltage distribution transformers, metal-halide lamp fixtures, power supplies for electronic devices, unit heaters, and traffic signals). "Appliance and Equipment Efficiency Standards," A.R.S. § 44-1375 (2006).

CA established Appliance Efficiency Regulations in 1976 and are updated periodically. The current regulations went into effect on December, 2006. Adopted as Title 20, the legislation applies to appliances sold or offered for sale in CA and includes the following types of appliances: refrigerators, freezers, vending machines, dishwashers, clothes washers and dryers, ovens and range top stoves, room air conditioners, central air conditioners, ceiling and whole house fans, space heaters, plumbing fittings (includes shower heads and faucets), toilets, fluorescent lamps, traffic signals, and others.

Volume of emissions in Utah:

Benefit/cost of reducing CO2 —cost per ton reduced: Energy Star estimates are that home electronics have experienced a saving of 6.0 Billion kWh and prevented emissions of 1.2 million metric tons CO2 equivalent while office savings have achieved a 40.4 Billion kWh savings and prevented emissions of 8.1 million metric tons CO2 equivalent. Energy efficiency standards for appliances can reduce pollutant emissions, improve electric system reliability, and hold the potential save energy producers and consumers significant amounts of money. By 2000 Federal standards had reduced electricity use by 2.5%. A study of California's product standards estimate that the state may save $3 billion by 2020. (http://www.epa.gov/cleanenergy/pdf/gta/guide_action_full.pdf

NM: -$46 per ton of CO2 http://www.nmclimatechange.us/ewebeditpro/items/O117F10150.pdf

AZ: The Southwest Energy Efficiency Project (SWEEP) estimated that these new standards will save Arizona consumers and business a total of $650 million on energy bills by 2030. Department of Energy. *Arizona Passes, Colorado Vetoes Appliance Efficiency Standards*, Available at http://www.eere.energy.gov/state_energy_program/news_detail.cfm/news_id=9028

How implementable: CA standards were issued by administrative rulemaking. The Arizona law takes effect in 2008.

Impacts, distribution of burdens, co-benefits: Testing requirements fall upon the manufacture to verify that the equipment meets specified standards (ANSI, etc.) as designated within the code. Testing costs are born by the manufacture and the Energy Commission bears the costs of inspection and enforcement. CA manufacturers continue to express concerns over switching costs, decreases in consumer choice, limited exemptions, supply chain issues costs and costs by delay in technology forcing initiatives.

Other comments/assessments: Voluntary Energy Star guidelines have been voluntary up to date and are resisting mandatory implementation by the CEC of their guidelines arguing that minimum efficiency standards undermine technological innovation. The organization encourages industry-led initiatives in the alternative. See http://www.energy.ca.gov/appliances/index.html; http://www.energy.ca.gov/appliances/documents/2006-02-10_IMPACT_ON_ENERGYSTAR.PDF

2. Variable speed drives

Definition: Variable speed drives could be installed on pump and fan motors allowing variable air volume and variable flow while eliminating bypass waste. Only the amount of air, water, and glycol necessary to meet the demand is circulated. This allows motors to operate at lower loads, thereby reducing electrical energy consumption.
Volume:

Cost: Variable speed drive motors have the potential to reduce CO2 emissions by 172,000 tons at $11 per ton (Utah, 2000).

Implementable:

Impacts:

Other comments:

3. Refrigeration

Definition: Refrigeration accounts for seven percent of electricity used within the commercial sector. It consists of four major groups: display refrigerators, storage refrigerators, processing refrigerators, and mechanical refrigeration machines. Depending on the use of the refrigerator and the specific type of model used, different strategies exist for improving efficiency. Some of the factors that determine a refrigerator's efficiency include desired refrigerated temperature, the amount of time the refrigerator is open, the amount of heat to be moved, the degree to which temperature outside the refrigerator influence the performance of the refrigerator, the quality and type of material that makes up the refrigerator, the energy efficiency of its parts, and the size and design of the refrigerator. Refrigerator improvements can offer impressive energy savings. Due to the size of savings involved, many of these measures pay for

themselves fairly quickly. It is estimated that the energy efficiency of most refrigerators could improve by 25 percent (Utah, 2000).

Volume:

Cost:

Implementable:

Impacts:

Other Comments:

RCI-36
Name: Promotion and Tax or Other Incentives (e.g. Energy Star, credits for solar hot water)

Definition: The EPA started the Energy Star program in 1992, a program that helps businesses and consumers improve energy efficiency. Building owners earn the Energy Star scoring in the top 25 percent on EPA's energy performance rating system, which calculates scores based on actual energy use. The top performing buildings that earned the Energy Star in 2006 include about 320 supermarkets, 320 office buildings, and 200 K-12 schools. Almost 90 banks, courthouses, financial centers, hospitals, hotels, and - for the first time - dormitories also earned the Energy Star. According to the EPA, buildings that earn the Energy Star use about 35 percent less energy than average buildings; about 400 Energy Star buildings use 50 percent less energy than average buildings. See http://www.energystar.gov <http://www.energystar.gov/>

The CA Energy Commission provides a financing program provides financing for schools, hospitals and local governments through low-interest loans for the installation of energy-saving measures which may include lighting, building insulation, heating and air conditioning modifications, automated energy management systems/controls, and streetlights/LED traffic signals.

Arizona has the following tax incentives for renewable energy:
Corporate Tax Credit: Commercial/Industrial Solar & Wind Tax Credit
Personal Deduction: Qualifying Wood Stove Deduction
Personal Tax Credit: Commercial/Industrial Solar & Wind Tax Credit
Residential Solar and Wind Energy Systems Tax Credit
Property Tax Exemption: Solar Energy Property Tax Exemption
Sales Tax Exemption: Solar and Wind Equipment Sales Tax Exemption
Utility Loan Program: Trico Electric Cooperative - Energy Conservation Home Improvement Loan
Utility Rebate Program: Solar power incentives
Source: Database of State Incentives for Renewables and Efficiency: Arizona. Available at http://www.dsireusa.org/library/includes/statesearch2.cfm?State=AZ&back=fintab&CurrentPageID=7&Search=TableState&EE=1&RE=1

Volume:

Cost:

Implementable: Up to $40 million is available in California. Loans can finance up to 100 percent of the cost of energy efficiency projects. The maximum loan amount is $3 million per application. There is no minimum loan amount. http://www.energy.ca.gov/efficiency/financing/index.html

Impacts:

Other comments:

RCI-37
Name: Bulk Purchasing Programs

Definition: A large purchase of energy efficient products, generally refrigerators or lighting. For example, GE, Sears and Whirlpool provide energy efficient refrigerators and other products in bulk to states. Typically, the selected provider also "decommissions" the old refrigerator.

Arizona passed a statute that requires its state agencies to acquire ENERGY STAR products, unless the items are not cost-effective (the showing of cost-effectiveness affects programs over $35,000; if the desired procurement costs more than $35,000, Arizona must demonstrate that a non-Energy Star product is more cost effective on a "life-cycle cost basis." The Arizona statute covers appliances, HVAC, lighting, office equipment, traffic signals, vehicles and other items. The Department of Energy considers refrigerator replacement an allowable energy conservation measure. *Arizona Statutes,* HB 2324, April 2003; *Energy Star Refrigerator Bulk Purchasing Program.* Available at http://www.waptac.org/sp.asp?mc=techaids_estar_bulk. See also, Harris, Jeffrey (LBNL), et. al, *Energy-Efficient Purchasing by State and Local Government: Triggering a Landslide down the Slippery Slope to Market Transformation*, Available at http://www.dc.lbl.gov/LBNLDC/publications/Energy%20Efficient%20Purchasing%20By%20State%20and%20Local%20Government.pdf

Volume:

Cost: The SWEEP 2003 report estimated that the bulk purchasing program could save Arizona $90 million over the next twelve years. The Arizona law and bulk purchasing programs reduce the cost of facilitating an energy efficiency program.

Implementable:

Impacts: Arizona state agencies have to purchase from Energy Star providers for larger contracts; It seems that the major competitors provide Energy Star products, but products from new competitors (potentially more economical) have to be rated Energy Star before they are an approved purchase for Arizona. Arizona has the burden of performing a life-cycle cost basis analysis of any products that are not Energy Star in contracts over $35,000.

Other comments:

RCI-38
Name: Utility/DSM Programs

Definition: Demand-Side Efficiency Goals, Funds, Incentives and Programs.

The goal of a utility/DSM (Demand Side Management) program is to secure additional investment in energy efficiency programs in order to secure cleaner energy at a lower cost. An example of a DSM program is a Public Benefit Fund (PBF). PBF's hold significant promise for increasing investment in energy efficiency programs and is included in the EPA's Clean Energy Environment Guide to Action. PBF's levy a small charge on a consumer's electricity bill in order to secure funding for investment in energy efficiency programs. Charges are typically equivalent to a $.27 to $2.50 charge on a residential consumer's monthly energy bill. Utilities can undertake a similar program by contributing a small amount of their retail (around 1%) to DMS programs within their base of operations. Performance based incentives, portfolio standards, energy trusts, decoupling of rates and revenues, and appropriate rate treatment for efficiency, are other examples of utility/DSM programs. (http://www.nmclimatechange.us/ewebeditpro/items/O117F10150.pdf) (http://www.epa.gov/cleanenergy/pdf/gta/guide_action_full.pdf)

Arizona utilities spent approximately $6.4 million on energy efficiency programs in 1999. The Arizona Corporation Commission requires utilities to obtain "at least 0.2 percent of their electric power from new solar and other renewable energy sources as of 2001, with the renewable energy fraction increasing to 1.1 percent by 2007." System Benefit Changes. The Climate Change Advisory Group in Arizona recommends that Arizona adopt energy savings goals for electricity and natural gas. The Arizona Climate Change Advisory Group (CCAG) estimates a savings of 103.00 MMtCo2e. The CCAG estimates that Arizona will have the following savings: Electricity (energy savings target): 5% savings by 2010, 15% savings by 2020; Natural gas (utility spending target): ramp up to spending 1.5% of gas utility revenues on energy efficiency programs by 2015. *Climate Change Action Plan August 2006* http://www.azclimatechange.us/ewebeditpro/items/O40F9347.pdf

A DSM may be independently administered by a utility but usually is enacted by state legislation in the form of a PBF. Once this is done, utilities aid in the implementation of a PBF by processing charges, administering the fund, and occasionally implementing energy efficiency measures. Non-profits may also play a role in the administration of DSM programs. The state and utilities then must decide the level and range of the charge to consumer energy bills. In the case of a PBF it is important that a program administrator has flexibility determining the allocation of resources if the program is to be cost effective and have maximum effect. States must then determine which energy efficiency programs are cost effective and promise the most return for investment. (http://www.swenergy.org/pubs/Natural_Gas_DSM_Programs_A_National_Survey.pdf.) (http://www.epa.gov/cleanenergy/pdf/gta/guide_action_full.pdf)

Volume:

Cost:

Implementable:

Impacts: Benefits include reduced energy demand at lower cost, reduced energy costs, improved reliability of electricity grid, creation of jobs, and stimulation of public and private sector investment. DSM impacts consumers and utilities significantly, especially with regards to long term savings.

Other Comments:

RCI-39
Name: Market transformation & technology development programs

Definition: Industry-led programs in Arizona promotes energy efficient technologies and polices that might affect Arizona businesses and industries. The Arizona Coalition for New Energy Technologies is a non-profit business coalition that promotes "clean and efficient energy technologies" by promoting innovative technologies. Arizona Solar Energy Association and Arizona Solar Energy Industries Association: Arizona chapters of the national organization focused on providing and developing solar power technologies. Industries of the Future: industry-led non-profit organization, created by members of the Agriculture, Aluminum, Forestry and Mining Industries of the Future Steering Committees.
Sources: *Arizona Coalition for New Energy Technologies,* available at http://www.newenergytechnologies.org/arizona/default.htm;
Arizona Solar Energy Association and *Arizona Solar Energy Industries Association*, available at http://www.azsolarcenter.com/solarorg/ariseia1.html;
Industries of the Future http://www.aziof.com/

Volume:

Cost:

Implementable: Industries and businesses participate in these technology development organizations to influence policy decisions about solar energy in Arizona.

Impacts:

Other comments:

RCI-40
Name: Use of Alternative Gases (other HFCs, hydrocarbon coolants, etc.)

Definition: Alternative gases for commercial refrigeration--stores, restaurants; could also apply to transport vehicles. *The California Climate Action Group recommended that the Governor explore working with California and other states in addressing HFC emissions from refrigeration systems.*

Volume:

Cost:

Implementable:

Impacts:

Other comments:

RCI-41
Name: Specific end-uses: lighting, water heating, office equipment, etc.

1. **Lighting**

Definition: Lighting results in about 35 percent of CO2 emissions in the commercial sector. There are a number of ways to reduce lighting-related energy use:

- High-Efficiency Lighting Retrofit replaces all existing magnetic ballasts and T12 F34 fluorescent lamps with electronic ballasts and T8 F32 lamps.
- Replace incandescent lamps with compact fluorescent lamps (CFLs). There are now CFLs available to fit almost any incandescent fixture. The payback for a retrofit of fixtures operated for about 12 hours per day is less than 6 months.
- High bay or outdoor lighting systems that use incandescent, mercury vapor, or fluorescent lamps can be replaced with high-efficiency High Intensity Discharge (HID) systems using metal halide, high- pressure sodium, or low-pressure sodium fixtures.
- Exit lights can be retrofitted with LED units. These are more expensive but are very cost effective given their extremely long life and low energy requirements (on the order of 2 watts).

Volume:

Cost: Lighting has the potential to reduce CO2 emissions by 899,000 tons at $15 per ton (Utah, 2000).

Implementable:

Impacts:

Other comments:

2. **Lighting controls**

Definition: Lighting controls include occupancy sensor controls installed in irregularly used areas such as restrooms and in common rooms such as break rooms or other spaces typically left vacant for extended periods with the lights left on.

- All spaces could have occupancy sensor control. Occupancy sensors can be infrared or ultrasonic as appropriate for the space.
    - Infrared sensors detect the presence of a person by body heat and operate well in areas with obstructions such as restrooms.
    - Ultrasonic sensors which detect movement are well suited for open areas such as corridors and conference rooms.
- Other options include time-of-day controls that schedule lighting for expected occupancy hours. Override switches allow temporary lighting for a specified period during scheduled unoccupied hours. Controls are also available for use with dimmable ballasts that allow dimming of light fixtures in spaces where daylight is available.

Volume:

Cost: Typical electricity savings from occupancy sensors in break rooms is 45-65 percent and 30-75 percent in restrooms. Lighting controls have the potential to reduce CO2 emissions 284,000 tons at $17 per ton (Utah, 2000).

Implementable:

Impacts:

Other comments:

3. Heating, Ventilation, and Air Conditioning

Definition: Heating, Ventilation, and Air Conditioning (HVAC) efficiencies are difficult to estimate because of the complexity of these systems. Larger commercial buildings tend to have more sophisticated heating and cooling systems and require much more active ventilation systems in order to maintain air quality than do smaller structures. A large building might require cooling a computer room, ventilating a machine room, and heating business offices. This diversity of needs is served in many large commercial buildings by a computerized system that regulates heating, ventilation, and air conditioning. Typical improvements that could be made include:

- improving efficiency of energy-using devices (e.g., using a higher-efficiency chiller);
- improving design of overall system (e.g., routing and designing ducts to minimize losses);
- switching to different systems (e.g., using a heat pump rather than electric resistance heating);
- improving system controls (e.g., using outside air for cooling when appropriate);
- improving maintenance (e.g., changing filters as needed); and
- reducing demand for services provided by the system (e.g., installing more efficient lights to reduce the need for space cooling).

HVAC Automatic Control Systems vary according to the level of controls required to effectively manage the system. For simple heating and cooling, all that may be required are time of day controls with night time temperature set back. More complex central heating and cooling plants could utilize dynamic optimal control sequences. This allows maximized performance through fans scheduling, temperature setback, optimum start/stop logic, discriminator-based discharge air temperature, integrated chilled water and discharge air temperature control, condensing water temperature adjustment, boiler control based on outside air temperature, CO2-based ventilation control, occupancy sensor controlled air supply, static pressure reset or terminal regulated volume control on variable volume fans, variable speed pump control, economizer control, and damper control (Utah, 2000).

Volume:

Cost: control systems have potential to reduce CO2 emissions by 126,000 tons at $35/ton (Utah, 2000).

Implementable:

Impacts:

Other comments:

RCI-42
Name: Incentives for climate mitigation-related businesses

Definition: *The California Climate Action Group recommended a combination of voluntary agreements with industries and new specifications for key equipment to reduce the emissions of process gases that have high global warming potential. It recommended the development of voluntary industry-government partnerships as has been done in other areas, such as has been done in the semi-conductor industry).*

Volume:

Cost:

Implementable:

Impacts:

Other comments:

Buildings: Improve Efficiency and Increase Use of Lower-GHG Fuels

RCI-43
Name: Promotion and Incentives for Improved Design and Construction (e.g. LEED, green buildings)

Definition: A green building is designed to meet certain objectives such as protecting occupant health; improving employee productivity; using energy, water, and other resources more efficiently; and reducing the overall impact to the environment. These buildings sometime cost more up front, but save through lower operating costs over the life of the building. In California, Gov. Schwarzenegger signed Executive Order S-20-04 regarding Green Buildings in December 2004. The order sets a goal of reducing energy use in state-owned buildings by 20 percent by 2015 (from a 2003 baseline) by specifically requiring LEED silver rating design projects. The order encourages the private commercial sector to set the same goal.

The Arizona Climate Change Advisory Group recommended:

- *Improved and increasingly stringent energy efficiency codes for Arizona.*
- *LEED (Leadership in Energy and Environmental Design) standards/certifications and/or other "green building" certifications and/or measured or modeled building energy performance criteria to specify building energy performance standards.*
- *A performance standard for State-owned or state-leased buildings to demonstrate the feasibility of achieving the minimum code requirements and significantly exceeding code requirements.*
- *A requirement that State-owned or leased facilities use life-cycle costing, including full consideration of future energy costs, in the selection and implementation of building designs and components (including energy using equipment such as heating, ventilation and air conditioning systems) for both new and renovated space, or for the selection of replacement components. Further, following life-cycle cost analysis, require that the most cost-effective design/equipment/component options be chosen.*
- *Financial or tax incentives for non-public and non-state public buildings (such as municipal buildings) to improve their energy performance beyond that required by existing codes.*

Source: Arizona: Climate Change Advisory Group. Climate Change Action Plan August 2006 http://www.azclimatechange.us/ewebeditpro/items/O40F9347.pdf

Volume:

Cost:

Implementable: The California order also directs compliance to the Green Building Action Plan, which details the measures the state will take to meet these goals. Financing is achieved by loan programs, revenue bonds, municipal tax-exempt leases and rate-payer increases. In the past, funding was made available in the form of competitive grants and contracts, to local government and state agencies to promote a whole building approach and to assist in the advancement and use of green building design and construction practices and techniques in California.
http://www.energy.ca.gov/greenbuilding/index.html
http://www.ciwmb.ca.gov/GreenBuilding/Basics.htm

Impacts:

Other comments:

RCI-44
Name: White Roofs, Rooftop Gardens, and Landscaping (Shade Trees)

Definition: *A green roof is a roof that is also a garden, from a simple container garden to a roof covered with several inches of soil (on top of a waterproof barrier) and a meadow. See Rooftop Gardens Reduce Smog, Improve Water Quality and More. http://www.gardeners.com/Rooftop-Gardens-Reduce-Smog--Improve-Water-Quality-and-More--/default/5283.page*

White roof coatings consist of a polymeric binder blended with pigments and other additives to provide two main benefits: 1) protection of roof membranes, for longer roof life cycles; and 2) reflectivity of solar radiation, for lower air conditioning costs. They are applied on a variety of roof substrates or membranes for a variety of reasons. For example, white roof coatings provide protection against water, chemicals, or physical damage. Additionally, white roof coatings protect a roof against excessive temperatures and UV radiation by reflecting visible light and stopping ultraviolet radiation.

White roof coatings provide three key attributes as part of a roofing system:

- *The ability to help shed water and keep interiors dry*
- *The ability to help reduce cooling costs for buildings with A/C units, and to help reduce interior temperatures on buildings with no cooling units.*
- *The ability to protect and prolong the roof system life cycle by reducing the "thermal shock" stress associated with large temperature changes.*

White coatings can be applied to practically any roofing surfaces, membranes, or substrates. They are commonly applied to sprayed polyurethane roofs to provide waterproofing. They can also be applied to metal roofs, single-ply rubber roofs and modified bitumen roofs. They can even be applied to certain kinds of asphalt roofs. It is important to establish compatibility between the white coating and the underlying roof membrane. See http://www.roofcoatings.org/wcc.html

Pima County Arizona had an Operation Cool Shade Program in 2005, which distributed 1,314 trees to 442 electric consumers. The TriCo Electric Cooperative funded the Operation Cool Shade Program. See *Saving Energy Costs with Operation Cool Shade. The University of Arizona: College of Agriculture and Life Sciences. Accessed on Feb. 12, 2007 at http://ag.arizona.edu/impacts/4_5.html.*

Volume:

Cost: *The Pima County Operation Cool Shade Program estimated that it saved $61,663 for the peak three-month summer period in 2004, based on the average peak household consumption (July, August and September) of 7,263 kilowatt hours and the current rate of $0.09602 per KWh. See Saving Energy Costs with Operation Cool Shade. The University of Arizona: College of Agriculture and Life Sciences. Accessed on Feb. 12, 2007 at http://ag.arizona.edu/impacts/4_5.html.*

Implementable:

Impacts:

Other comments:

RCI-45
Name: Improved Building Codes

Definition: Improved building codes, recommendations, and assessments and associated programs establish and monitor standards for energy efficiency technologies and products that are required to be used in construction and retrofit of commercial buildings, and could also be applied to existing buildings undergoing renovations. Codes usually address improvements in "thermal resistance" in the exterior and windows, air leakage, and heating and cooling efficiencies. (http://www.epa.gov/cleanenergy/pdf/gta/guide_action_full.pdf).

The Department of Energy (DOE) reviews codes set by model code organizations, such as the International Code Council (ICC), and provide building energy code models to states who then tailor them to their needs. Model code organizations can also serve as a resource in the training of code officials as well as the providing of technical support.

CA established Energy Efficiency Standards for Residential and Nonresidential Buildings in 1978, known as Title 24 regulations. http://www.energy.ca.gov/title24/

The Arizona Climate Change Advisory Group recommended adoption of a statewide code or strongly encourage municipalities to adopt and maintain improved building codes; that Arizona and municipalities adopt the 2004 International Energy Conservation Code (IECC), and consider adopting innovative features of California's latest Title 24 building energy codes, such as lighting efficiency requirements in new homes; and that Arizona and local jurisdictions update energy codes regularly, such as a three-year cycle of review based on the national model codes release. Arizona is a "home-rule state" meaning that the municipalities are able to adopt and enforce their residential and commercial building energy codes. See http://www.azclimatechange.us/ewebeditpro/items/O40F9347.pdf

Volume:

Cost: NM: -$12 per ton of C02 (http://www.nmclimatechange.us/ewebeditpro/items/O117F10150.pdf

Implementable: There are barriers to the implementation of building energy efficiency codes such as the size and fragmentation of the building industry. States can provide educational programs to groups within the construction community to overcome this barrier. Consumers may be unaware of the economic and environmental benefits of energy efficient building processes. (http://www.epa.gov/cleanenergy/pdf/gta/guide_action_full.pdf). Timing is integral in the enforcement of building codes. Implementation of improved building codes during construction is much more cost effective than post-construction remodeling.

Impacts: In California, costs are generally born by builders who must verify that their projects meet Title 24 standards through an independent third-party inspection. In combination with the implementation of energy efficient appliances, these building efficiency standards are estimated to have saved more than $56 billion in electricity and natural gas costs since their implementation and It is estimated the standards will save an additional $23 billion by 2013.

Other comments:
The City of Tucson has implemented a Sustainable Energy Standard for city-owned and financed residential, multi-family and commercial buildings. See Southwest Energy Efficiency Project (SWEEP). http://www.swenergy.org/

RCI-46
Name: Training and Enforcement of Building Codes

Definition: The CA Energy Commission (CEC) established regulations for a Home Energy Rating System (HERS) Program to certify home energy rating services in California. The program includes field verification and diagnostic testing available through Commission-certified providers. These providers perform third-party inspections for verification of duct sealing, thermostatic expansion valves (TXVs), refrigerant charge, airflow measurement, and building envelope sealing measures with state mandated standards. http://www.energy.ca.gov/HERS/index.html

Volume:

Cost:

I**mplementable**:

Impacts:

Other comments:

RCI-47
Name: Increased use of blended cement

Definition: "*Blended hydraulic cements are produced by intimately blending two or more types of cementitious material. Primary blending materials are portland cement, ground granulated blast-furnace slag, fly ash, natural pozzolans, and silica fume." Portland Cement Association, "Cement and Concrete Basics," http://www.cement.org/basics/concretebasics_history.asp*

Volume:

Cost:

Implementable:

Impacts:

Other comments:

RCI-48
Name: Building Commissioning and Recommissioning

Definition: Commissioning is the process of inspecting and testing a building to ensure that all systems are operating as intended and is repeated (recommissioning) periodically over a building's life. The commissioning process includes verification of proper performance regarding equipment and installation, controls, operations, and default settings. Each system component is checked to verify design performance. Occupancy sensors are monitored as well as light and humidity levels. California Code Title 24 requires contractors to test a home's ducts for leaks when a new central air conditioner or furnace is installed or replaced. If the ducts leak 15% or more, they must be repaired. Testing is performed by an independent third party. Regulations are limited to inland climate zones where there is substantial air conditioning or heating. Contractors must be licensed through the state licensing board and must get building permits for replacement of space conditioning equipment valued at $500 or more. http://www.cacx.org/
http://www.cslb.ca.gov/news/industry20050929.asp.

Utah's net-metering law, enacted in 2002, requires all electric utilities and cooperatives (municipal utilities are excluded) to allow customers to connect renewable energy systems to the grid for their own use and to supply excess electricity to the electric grid. Eligible renewable energy systems include fuel cells, solar, wind or small hydropower facilities with a generating capacity of up to 25 kilowatts. Total participation in the program is capped at 0.1% of the cumulative generating capacity of the electrical corporation's peak demand during 2001. If a customer generates more electricity than the customer uses during a billing period, the utility must credit the customer for the net excess generation (NEG) at a rate equal to the utility's avoided cost or higher.
http://geology.utah.gov/sep/incentives/rincentives.htm#netmeter; Utah Code § 54-15-1-1 et seq.

Volume:

Cost: Building commissioning/recommissioning has the potential to reduce CO2 emissions by 731,000 tons at $1 per ton (Utah, 2000).

Implementable:

Impacts:

Other comments:

RCI-49
Name: Energy Management Training / Training of Building Operators

Definition: *The CA Energy Commission provides online training in residential, non-residential and CHPS (Collaborative for High Performance Schools) categories through an online website. This site provides video training on a variety of energy code and related building science issues, and offers guidance on the design and construction of efficient, durable and sustainable buildings which includes residential codes, energy codes, building envelopes, and HVAC assistance. Additional training can also be provided by private consultants as well as public trainings offered through local utility service providers. http://www.energy.ca.gov/HERS/index.html; http://www.energy.ca.gov/title24/training/index.html; http://www.socalgas.com/construction/freeresources.shtml*

Volume:

Cost:

Implementable:

Impacts:

Other comments:

RCI-50
Name: Energy Tracking and Benchmarking

Definition: *This may refer to a policy of establishing long-term goals and interim targets or benchmarks for improving energy efficiency. For example, a 2004 Western Governors Association clean and diversified energy resolution suggested states set a goal of reducing electricity use by 20% from projected levels in 2020. See RCI 1-3.*

Volume:

Cost:

Implementable:

Impacts:

Other comments:

Other

RCI-51
Name: Incentives for Renewable Energy Applications (Solar roofs, etc.)

Definition: *See RCI 36 for a discussion of incentives for appliances. The discussion here focuses on incentives for buildings.*

Arizona offers a variety of incentives to promote the use of renewable energy. In 2006, Arizona passed a Corporate Tax Credit of up to $25,000 per building and $50,000 per year to cover a portion of the installation costs for Solar and Wind Power systems. Arizona has a personal tax credit of up to $1,000 for solar and wind power systems. Arizona also subtracts up to $5,000 from an individual's income tax for energy efficient residences (Homes that score 90 or above on a home energy rating are eligible). Arizona residential, commercial, and industrial properties are exempt from any property tax increases that occur as a result of installing a solar energy system. (HB 2429, June 2006). Consumers wishing to install their own solar or wind power systems do not pay any sales tax on the equipment. (HB 2429, June 2006). See: Arizona Incentives for Renewables and Efficiency. Database of State Incentives for Renewables and Efficiency. http://www.dsireusa.org/; Renewables: Solar. State of Arizona. http://www.azcommerce.com/Energy/Renewable/http://www.az.gov

CA's Million Solar Roofs Program has set a goal to create 3,000 megawatts of new, solar-produced electricity by 2017. The California Public Utilities Commission provides over $2 billion in incentives over the next decade for existing residential homes and existing and new commercial, industrial, and agricultural properties. The California Energy Commission manages a 10-year, $350 million program to encourage solar in new home construction through its New Solar Homes Partnership. In March 2006, the CPUC opened a proceeding to develop rules and procedures for the Solar Initiative and to continue consideration of policies for the development of cost-effective, clean and reliable distributed generation (DG). The PUC continues to hold public workshops to continue designing program elements. The program was originally designed to provide incentives in an upfront, capacity-based payment, however, the program system will change to performance-based payments. Notably, funds for solar installations for existing and new low-income and affordable housing are also available. See: http://www.gosolarcalifornia.ca.gov/csi/index.html

Volume:

Cost:

Implementable:

Impacts:

Other comments:

RCI-52
Name: Green Power Purchases

Definition: Experience from other states shows that the residential sector is most likely to participate in green power purchases, followed by the commercial sector and the industrial sector. By 2010 it is feasible that 5 percent of the consumers in the residential sector and 2 or 3 percent in the commercial and industrial sectors would likely participate in such a program, given an aggressive marketing campaign.

Volume:

Cost: Green marketing has the potential to reduce CO2 emissions 98,000 tons at $137 per ton (Utah, 2000).

Implementable:

Impacts:

Other comments:

RCI-53
Name: Clean Combined Heat and Power

Definition: Regulations and/or incentives to encourage CHP as a way to improve the efficiency of fuel use.

Description: CHP is the simultaneous generation of multiple forms of energy (usually mechanical and thermal) in a single system to improve the systems efficiency. (http://www.epa.gov/chp/pdf/intro.pdf) Barriers to the market penetration of CHP systems include: inadequate information, institutional barriers, high transaction costs due to small projects, high financing costs because of unfamiliarity and perceived risk, "split incentives" between building owners and tenants, as well as utility related policies such as interconnection requirement, high standby rates, and exit fees. Incentives would be implemented to reduce these barriers to CHP systems include; subsidies for the purchasing/selling of CHP systems, tax credits/exemptions for the buying, selling, and/or operating of CHP systems, feed in tariffs which are a direct payment for every kWh or BTU of heat produced from a CHP system, or tax credits for each kWh or BTU produced from a CHP system. (http://www.nmclimatechange.us/ewebeditpro/items/O117F10150.pdf)

Arizona has forty-one CHP sites in a variety of sectors—education, health care, industry, resorts and lodging, government buildings and others (retirement homes, business park, etc.) For example, Arizona has implemented CHP technology in the Ina Road Water Pollution Control Facility, a facility that treats and disposes sewage from Tucson. The CHP in this plant saves an estimated 1,000,000 in energy costs and increases efficiency by 65%. See: Intermountain CHP Application Center. Ina Road Water Pollution Control Facility. Accessed Feb. 12, 2007 at http://www.intermountainchp.org/casestudies/Ina_Road.pdf

Utah has a Tesoro Petroleum CHP plant that saves an estimated 500 tons per year of GHGs. See: Intermountain CHP Application Center. Tesoro Petroleum: 22-MW CHP Application. Accessed Feb. 12, 2007 at http://www.intermountainchp.org/casestudies/Tesoro_Petroleum.pdf

Volume:

Costs: *A state-of-the-art central plant (a combined cycle combustion turbine using natural gas) offers a maximum system fuel efficiency for delivered power in the range of 55-60%. According to the United States Heat and Power Association, at this efficiency level, CHP systems will effectively double the central electric system's average delivered fuel-use efficiency of about 30%. The association argues that under typical conditions, CHP systems can achieve efficiencies exceeding 70%, and systems have been shown to reach levels in excess of 90%. See: United States Heat and Power Association. CHP Basics. http://uschpa.admgt.com/CHPbasics.htm*

Implementation: New Mexico may model its program after those in Connecticut, Rhode Island, Nevada, Pennsylvania, and Vermont.

Impacts: In addition to a reduction in GHG gases New Mexico estimates that a consistent growth in CHP generation could produce about 650 MW.

Other comments:

RCI-54
Name: Fuel Switching to less carbon-intensive fuels

Definition: *This may be better addressed under the Energy Supply category.*

In 2005, the CA Biomass Collaborative was created in order to develop an integrated and comprehensive state policy on biomass, which includes electricity, natural gas and petroleum substitution potential. The policy should also address potential benefits, such as reducing municipal solid waste, which a wide range of conversion technologies can capture. State goals have been set regarding biofuels at a minimum of 20 percent production within CA by 2010, 40 percent by 2020, and 75 percent by 2050. With regard to biomass use for electricity, the state goal is a 20 percent target within established state goals for 2010 and 2020. The project is still within the research phase. Currently, implementation is carried out through the Bioenergy Interagency Working Group. The group is spearheading efforts to research and provide advisement to the governor. The agency consists of representatives from the Air Resources Board, California Energy Commission, California Environmental Protection Agency, California Resources Agency, Department of Food and Agriculture, Department of Forestry and Fire Protection, Department of General Services, Integrated Waste Management Board, Public Utilities Commission, State Water Resources Control Board. Greenhouse gas reduction is to be specifically addressed by the group with respect to biofuels in transportation, stationary and energy sectors. The first reports are due in June of 2007. A peer reviewed study and CBA is due by July 31, 2008. The working group has currently addressed that full implementation will require amended legislation. Recommendations for tax incentives and grants have also been made. Finally, a permit cap-and-trade system aligned with state GHG reduction targets has also been addressed by the working group. See: http://www.energy.ca.gov/bioenergy_action_plan/index.html http://www.energy.ca.gov/2006publications/CEC-600-2006-010/CEC-600-2006-010.PDF

Volume:

Cost:

Implementable:

Impacts:

Other comments:

RCI-55
Name: Net-metering policies

Definition: Net-metering programs require utilities to meter and buy back surplus energy generated by retail electric customers. *Net Metering measures the difference between the electricity consumed and from the utility and the electricity generated using solar or wind generating equipment. The meter keeps track of this difference as electricity is generated and takes electricity from the electricity transmission grid. A Net Metering agreement allows the customer to use the electricity she generates first, reducing what would normally be bought from the utility. If more electricity is generated than is used, the excess goes through the electric meter and into the grid, spinning the meter backward. The meter shows the net amount, measured as the difference between the electricity generated and the electricity purchased from the utility. Most residential and small commercial customers have simple meters that are bi-directional, capable of turning in both directions. Some utilities or ESPs may want two meters for net metering, one to measure electricity going from the grid to a home or business, and one to measure the excess going from the system to the grid. For consumers, net-metering offers a variety of benefits, depending on the size of the generating system. If it is a smaller, less expensive system, consumers can still offset most or all of their electricity needs because of the higher value of the excess electricity. If it is a larger system, consumers can "bank" or store excess electricity on the grid and offset all of the electricity they would otherwise purchase from a utility or ESP. Under a net-metering agreement, the utility continues to read the meter monthly. On the anniversary of the agreement, consumers are billed for the net electricity consumed. If there is a credit, the utility is not required to pay it, but it might do so. It should be noted that if an ESP is willing to buy the "net" annual generation, it does not have to pay full retail prices for it. While the actual rate paid would be up to the ESP, it would likely be less than retail and closer to "wholesale" rates, which are much lower. See:*
http://www.gosolarcalifornia.ca.gov/solar101/net_metering.html

Volume:

Cost: Net metering has the potential to reduce CO2 emissions of 115,000 tons at $191 per ton (Utah, 2000).

Implementable:

Impacts:

Other comments:

RCI-56
Name: Time of Use Rates

Definition: Changes in rate structure such as discouraging decreasing block rates, inverted block rates that impose higher tariffs on larger users, and pursuing peak time surcharge rates to encourage energy efficiency.

Some rates will benefit customers who have very little need for electricity during summer weekday daytime hours and use almost all their energy in off-peak hours, while other rates are designed for larger businesses that have the flexibility to mover their times of power consumption to off-peak hours. Different prices are allocated for off-peak usage as well as businesses that are willing to become part of the interruptible service program (i.e. these businesses are willing to interrupt their power consumption upon request by the utility).

Residential Time-of-Use (TOU) Rates are available for homes where most electricity is used between 6:00 PM and 10:00 AM. Related to this are Domestic Seasonal Rates for homes with higher electricity use in winter than in summer. Business rates have four levels available to most businesses depending upon their business needs. Business customers should consider if when they have need of power. See: http://www.sce.com/CustomerService/QuickAnswers/Rates/default.htm

Volume:

Cost:

Implementable:

Impacts:

Other comments:

RCI-57
Name: Reinvestment Fund

Definition: *This may refer to public benefit funds—a tax or surcharge is placed on consumers of electricity and funds used for efficiency and renewable energy projects. See RCI-2*

Volume:

Cost:

Implementable:

Impacts:

Other comments:

RCI-58
Name: Municipal Energy Management

Definition: *See RCI-45 for an example of municipal energy management policy.*

Volume:

Cost:

Implementable:

Impacts:

Other comments:

RCI-59
Name: Water pumping and treatment efficiency

Definition: *The water treatment and recycling infrastructure generally demands a large amount of energy to process and transport water and wastewater. Local utilities may be able to offer rebates and incentives for retrofit projects as well as incentives and design assistance for new construction projects to help businesses save money and manage energy costs. Some examples of equipment qualifying for rebates include premium lighting, occupancy sensors, daylighting controls, and premium efficient motors and pumps. Additionally, cash incentives and design assistance are available for new buildings and system processes such as low pressure ultraviolet (UV) disinfection systems or fine bubble aeration.*

Program participation levels vary according to the customer and the desired objective. Some customers may desire a Targeted Energy Audit in which technical consultants inspect a facility and identify low-cost and no-cost energy-saving techniques that are immediately able to be implemented. These consultants will generate a customer report that outlines the benefits of recommendations, which will focus on specific measures and technologies that deliver immediate peak-demand and energy savings. Customers are generally prescreened, and audits will be prioritized based on the highest potential energy savings of eligible customers. For other users, a Phone Energy Survey may be appropriate in which a utility representative conducts an energy survey over the phone by collecting information about the major appliances and equipment in a facility. A customer report is then generated, which includes recommendations on how to save energy by replacing appliances or operating them more efficiently.

A final option can be business-tailored solutions such as the Growing Business Success CD-ROM, a self energy audit tool that helps users understand energy use and identify specific actions they can take to reduce business energy costs. The CD-ROM provides a customized energy analysis tailored to each facility using information provided by the user and by available billing information. The analysis ranks the different efficiency options and contains links to resources on a wide variety of energy topics relevant to each facility. See: http://www.pge.com/biz/rebates/water_treatment/

Volume:

Cost:

Implementable:

Impacts:

Other comments:

Source for Utah references:
Utah, 2000: Utah Department of Natural Resources. Greenhouse Gas Reduction Strategies in Utah: An Economic & Policy Analysis.
http://www.epa.gov/climatechange/wycd/stateandlocalgov/downloads/UtahActionPlan.pdf